Amendments to the Claims

Please amend Claims 1, 9 and 12 and add Claims 34-50 as follows.

1. (Currently Amended) An image processor comprising:

generating means for generating data relating to respective applying amounts of low-concentration ink and high-concentration ink, which has a same type color as the low-concentration ink and has a higher concentration than that of the low-concentration ink, based on input image data for printing an image on a printing medium, the low-concentration and high-concentration inks being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to the respective applying amounts of the low-concentration and the high-concentration inks based on the input image data ~~for printing an image on the printing medium,~~ so that, within a range from a low gradation level to a high gradation level of colors expressed by the input image data, as the gradation level rises, the applying amount of the low-concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level lower than the gradation level corresponding to the first peak amount, the applying amount of the high-concentration ink is gradually increased up to a second peak amount lower than the first peak amount, and

wherein the number of levels of gradation ~~represented~~ representable by the dots ~~of~~ formed on the unit area based on the data relating to the applying amount of the low-concentration ink is greater than the number of levels of gradation ~~represented~~ representable by the dots ~~of~~ formed on the unit area based on the data relating to the applying amount of the high-concentration ink.

Claim 2 (Canceled).

3. (Previously Presented) An image processor according to claim 1, wherein the applying amount of the low-concentration ink at the predetermined gradation level is 2 or more times the second peak amount.

4. (Previously Presented) An image processor according to claim 1, wherein the applying amount of the low-concentration ink at the predetermined gradation level is 1.75 or more times the second peak amount.

5. (Previously Presented) An image processor according to claim 1, wherein the first peak amount is 1.75 or more times the second peak amount.

6. (Previously Presented) An image processor according to claim 1, wherein the first peak amount is 2 or more times the second peak amount.

7. (Previously Presented) An image processor according to claim 1, wherein said generating means generates the data corresponding to the number of the low-density dots and the number of the high-density dots, both of which are to be formed for the unit area in accordance with the gradation level.

8. (Previously Presented) An image processor according to claim 7, wherein the number of the low-density dots that are formed for the unit area at the gradation level that corresponds to the first peak amount is 1.75 or more times the number of the high-density dots that are formed for the unit area at the gradation level that corresponds to the second peak amount.

9. (Currently Amended) An image processor according to claim 1, wherein a granularity G of the image by a granularity evaluation function is set to be 0.6 or less than 0.6, the image corresponding to respective gradation levels in the range from the predetermined gradation level to the gradation level corresponding to the second peak amount, and

the granularity evaluation function for evaluating the granularity G that is the standard deviation of the pixel values in an image P' that was obtained by putting [[t]] an image P through a visual filter being expressed by the following expression:

$$G = \left\{ 1/\left(N^2 - 1\right) \sum_{i,j=1}^{N} \left(P'ij - \overline{P}\right)^2 \right\}^{1/2}$$

$$\overline{P} = 1/N^2 \sum_{i,j=1}^{N} P'ij$$

$$P'ij = IFFT\left\{ FFT(P'ij) \sum V(f) \right\}$$

$$V(f) = \begin{cases} 5.05e^{-0.138f}\left(1 - e^{-0.1f}\right) & : f \geq 5 \\ 1 & : f < 5 \end{cases}$$

where i is a pixel position in an X direction, j is a pixel position in a Y direction, and N is a size of the image P in the X direction and in the Y direction.

10. (Previously Presented) An image processor according to claim 9, wherein the granularity G of the image by the granularity evaluation function is set to be 0.4 or less than 0.4, the image corresponding to respective gradation levels in the range from the predetermined gradation level to the gradation level corresponding to the second peak amount.

Claim 11 (Canceled).

12. (Currently Amended) An image processing method comprising:

a generating step of generating data relating to respective applying amounts of low-concentration ink and high-concentration ink, which has a same type color as the low-concentration ink and has a higher concentration than that of the low-concentration ink, based on

input image data for printing an image on a printing medium, the low-concentration and high-concentration inks being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating step generates the data relating to the respective applying amounts of the low-concentration and the high-concentration inks based on the input image data ~~for printing an image on the printing medium,~~ so that, within a range from a low gradation level to a high gradation level of colors expressed by the input image data, as the gradation level rises, the applying amount of the low-concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level lower than the gradation level corresponding to the first peak amount, the applying amount of the high-concentration ink is gradually increased up to a second peak amount lower than the first peak amount, and

wherein the number of levels of gradation ~~represented~~ representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration ink is greater than the number of levels of gradation ~~represented~~ representable by the dots ~~of~~ formed on the unit area based on the data relating to the applying amount of the high-concentration ink.

Claims 13-33 (Canceled).

34. (New) A printing method comprising:

an image processing step for executing the image processing method according to Claim 12; and

a dot forming step for forming the low-density dots and the high-density dots on the printing medium in accordance with the data relating to respective applying amounts of the low-concentration and high-concentration inks generated in said image processing step.

35. (New) An image processing apparatus according to Claim 1, wherein the input image data is multi-valued data of R, G and B,

the data relating to the applying amount of the low-concentration ink is multi-valued data corresponding to magenta ink, and

the data relating to the applying amount of the high-concentration ink is multi-valued data corresponding to a second magenta ink having a lower concentration than the magenta ink.

36. (New) A printing apparatus comprising:

an image processor according to Claim 1; and

a printing portion for forming the low-density dots and the high-density dots on the printing medium in accordance with the data relating to respective applying amounts of the low-concentration and high-concentration inks generated by said image processor.

37. (New) A control program stored on a computer-readable medium for controlling a printing apparatus according to Claim 36.

38. (New) An image processing apparatus according to claim 1, wherein the input image data is multiple-valued data of R, G and B.

39. (New) An image processing apparatus according to claim 1, wherein the input image data is multiple-valued data of R, G and B,

the data relating to the applying amount of low concentration ink is multi-valued data corresponding to cyan ink, and

the data relating to the applying amount of high concentration ink is multi-valued data corresponding to a second cyan ink having a lower concentration than the cyan ink.

40. (New) An image processor comprising:

generating means for generating data relating to respective applying amounts of low concentration print material and high concentration print material that has a same type color as the low concentration print material and has a higher concentration than the low concentration print material, based on input image data for printing an image on a printing medium, the low and high concentration print materials including respective color materials and being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to respective applying amounts of the low concentration and high concentration print materials based on the input image data, so that, within a range from a low gradation level to a high gradation level of colors expressed by the input image data, as the gradation level rises, the applying amount of the low concentration print material is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration print material is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration print material is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration print material.

41. (New) An image processor comprising:

generating means for generating multi-valued data corresponding to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on multi-valued data of R, G and B for printing an image on a printing medium, the low and high

concentration inks to be applied on a unit area of the printing medium,

wherein said generating means generates the multi-valued data corresponding to respective applying amounts of the low concentration and the high concentration inks based on the multi-valued data of R, G and B, so that, within a range from a low gradation level to a high gradation level of colors expressed by the multi-valued data of R, G and B, as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable for the unit area based on the multi-valued data corresponding to the low concentration ink is greater than the number of levels of gradation representable for the unit area based on the multi-valued data corresponding to the high concentration ink.

42. (New) An image processor comprising:

generating means for generating data relating to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on input image data for printing an image on a printing medium, the low and high concentration inks

being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to respective applying amounts of the low concentration and the high concentration inks based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating the applying amount of the low concentration ink is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating the applying amount of the high concentration ink.

43. (New) An image processor comprising:

generating means for generating data relating to respective applying amounts of low concentration print material and high concentration print material that has a same type color as the low concentration print material and has a higher concentration than the low concentration

print material, based on input image data for printing an image on a printing medium, the low and high concentration print materials including color materials and being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to respective applying amounts of the low concentration and the high concentration print materials based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration print material is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration print material is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration print material is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration print material.

44. (New) An image processor comprising:

generating means for generating data relating to respective applying amounts of low concentration liquid and high concentration liquid that has a same type color as the low concentration liquid and has a higher concentration than the low concentration liquid, based on input image data for printing an image on a printing medium, the low and high concentration liquids being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to respective applying amounts of the low concentration and the high concentration liquids based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration liquid is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration liquid is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration liquid is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration liquid.

45. (New) An image processor comprising:

generating means for generating data relating to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on color of a range from a low gradation level to a high gradation level of colors expressed by input image data for printing an image on a printing medium, the low and high concentration inks being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating means generates the data relating to respective applying amounts of the low concentration and the high concentration inks based on the input image data, so that as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration ink is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration ink.

46. (New) An image processing method comprising:

a generating step for generating multi-valued data corresponding to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on multi-valued data of R, G and B for printing an image on a printing medium, the low and high concentration inks for being applied on a unit area of the printing medium,

wherein said generating step generates the multi-valued data corresponding to respective applying amounts of the low concentration and the high concentration inks based on the multi-valued data of R, G and B, so that, within a range from a low gradation level to a high gradation level of colors expressed by the multi-valued data of R, G and B, as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable for the unit area based on the multi-valued data corresponding to the low concentration ink is greater than the number of levels of gradation representable for the unit area based on the multi-valued data corresponding to the high concentration ink.

47. (New) An image processing method comprising:

a generating step for generating data relating to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on input image data for printing an image on a printing medium, the low and high concentration inks being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating step generates the data relating to respective applying amounts of the low concentration and the high concentration inks based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration ink is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration ink.

48. (New) An image processing method comprising:

a generating step for generating data relating to respective applying amounts of low concentration print material and high concentration print material that has a same type color as the low concentration print material and has a higher concentration than the low concentration print material, based on input image data for printing an image on a printing medium, the low and high concentration print materials including color materials and being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating step generates the data relating to respective applying amounts of the low concentration and the high concentration print materials based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration print material is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of the high concentration print material is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration print material is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration print material.

49. (New) An image processing method comprising:

a generating step for generating data relating to respective applying amounts of low concentration liquid and high concentration liquid that has a same type color as the low concentration liquid and has a higher concentration than the low concentration liquid, based on input image data for printing an image on a printing medium, the low and high concentration liquids being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating step generates the data relating to respective applying amounts of the low concentration and the high concentration liquids based on the input image data, so that, within a range from a low gradation level to a high gradation level indicative of a predetermined hue expressed by the input image data, as the gradation level rises, the applying amount of the low concentration liquid is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first peak amount, the applying amount of

the high concentration liquid is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration liquid is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration liquid.

50. (New) An image processing method comprising:

a generating step for generating data relating to respective applying amounts of low concentration ink and high concentration ink that has a same type color as the low concentration ink and has a higher concentration than the low concentration ink, based on color of a range from a low gradation level to a high gradation level of colors expressed by input image data for printing an image on a printing medium, the low and high concentration inks being used for forming low-density dots and high-density dots on a unit area of the printing medium,

wherein said generating step generates the data relating to respective applying amounts of the low concentration and the high concentration inks based on the input image data, so that as the gradation level rises, the applying amount of the low concentration ink is gradually increased up to a first peak amount and after reaching the first peak amount, gradually decreased, and as the gradation level rises from a gradation level corresponding to the first peak amount or from a predetermined gradation level smaller than the gradation level corresponding to the first

peak amount, the applying amount of the high concentration ink is gradually increased up to a second peak amount smaller than the first peak amount, and

wherein the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the low concentration ink is greater than the number of levels of gradation representable by the dots formed on the unit area based on the data relating to the applying amount of the high concentration ink.